

Patent claims

1. A method for controlling a hydraulic system, particularly of self-propelled plant with at least one internal combustion engine (2), driving at least one hydraulic pump (3, 4, 23, 24) with adjustable volumetric displacement and possibly additional fixed-displacement pumps (5, 25, 26) whereby:
 - the speed of the internal combustion engine (2) is detected by a metrological instrument (18);
 - the difference in pressure (12, 13, 14, 15, 44, 45, 46, 47) and the volumetric displacement (16, 17, 42, 43) of at least one hydraulic pump (3, 4, 23, 24) with adjustable volumetric displacement is determined by at least one measurement unit;
 - the power available from the internal combustion engine (2) is determined from the speed measured;
 - the power consumed by each hydraulic pump (3, 4, 23, 24) with adjustable volumetric displacement is determined from the difference in pressure measured, the volumetric displacement and the speed;
 - so that the volumetric displacement of at least one hydraulic pump with adjustable volumetric displacement (3, 4, 23, 24) is controlled by a control system (1) so that the total power consumed by at least one hydraulic pump (3, 4, 23, 24) with adjustable volumetric displacement is lower than or equal to the power available from the internal combustion engine (2) or the power delivered or is restricted by the pump, if applicable, in the case of energy recovery at the hydraulic pump.
2. A method according to claim 1, characterised in that the power consumed by each of the fixed-displacement pumps (5, 25, 26) driven by the internal combustion engine (2) is approximated from the speed of the drive by calculation and possibly the system pressure measured, and added to the total power consumed.
3. A method according to claim 1 or 2, characterised in that if the calculation of the power of the internal combustion engine (2) and/or the hydraulic pumps with adjustable volumetric displacement (3, 4, 23, 24) and/or the hydraulic fixed-displacement pumps (5, 25, 26) takes place by means of stored effective relationships, particularly in the form of characteristic curves or families of characteristics.
4. A method according to one of the preceding claims, characterised in that if several hydraulic pumps with adjustable volumetric displacement (3, 4, 23, 24) are present, the volumetric displacement of the individual hydraulic pumps is set or limited using stored control relationships, particularly for prioritising individual hydraulic pumps.
5. A method according to one of the preceding claims, characterised in that at least one input device (19, 20), particularly an accelerator pedal (19) and/or a joystick (20) detects a control command from an operator.
6. A method according to claim 5, characterised in that, if several hydraulic pumps

with adjustable volumetric displacement (3, 4, 23, 24) are present, the volumetric displacement of these individual hydraulic pumps (3,4 23, 24) are adjusted according to the operator's control commands.

7. A method according to one of the preceding claims, characterised in that the control system controls the power delivered or made available by the internal combustion engine (2) by influencing its speed, in addition to adjusting the power consumed by the hydraulic pumps with adjustable volumetric displacement (3, 4, 23, 24).
8. A method according to one of the preceding claims, characterised in that the power delivered to the internal combustion engine (2) is integrated into the calculation of total power in operating modes in which a hydraulic pump with adjustable volumetric displacement (3, 4, 23, 24) acts as a drive (energy recovery from potential load and braking energy).
9. A method according to one of the preceding claims, characterised in that to allow for further measured system states, particularly vehicle speed, position of the plant hydraulic system and the temperature of the hydraulic fluid, to control the individual hydraulic pumps with adjustable volumetric displacement (3, 4, 23, 24).
10. A method according to one of the preceding claims, characterised in that in a case in which a hydrodynamic converter is provided for motive transmission, its power consumption, particularly from a stored speed-torque characteristic, will be calculated by the control system (1) and taken into consideration in the total power calculation.
11. Electronic control system to implement the method according to one of the preceding claims.